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Three-dimensional seismic attenuation structure beneath the Taiwan region and its tectonic and thermal implications

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A fine-scale three-dimensional seismic attenuation structure beneath the Taiwan region has been obtained by using seismic intensity data recorded by the Central Weather Bureau Seismographic Network and from historical data. We correlated the inversion results with other data, such as three-dimensional velocity models, observed anomalous intensity distribution, seismicity, and gravity data. The results of the inversion reveal a remarkable contrast in the attenuation structure and reflect the lateral variation of thermal structure beneath the study area. For example, the possible location of the plate boundary between the Eurasian and Philippine Sea plates is characterized by a sharp lateral variation of Q values from the upper to lower crust beneath the eastern flank of the Central Range. For the northern part of study area, low-Q zones are distributed in the crust and the mantle wedge beneath northern Taiwan which is consistent with the distribution of fossil volcanoes existing in this area. The extent and depth of low Q values are also apparent in southwestern Taiwan. In order to investigate the variation of Q values of the central Taiwan before and after the Chichi earthquake, two attenuation models were determined by inversion of intensity data set recorded before and after main shock, respectively. In comparison of these two models, a remarkable change from high-Q values before the main shock to low-Q values after the main shock is observed in the area to the east side of the Chelungpu Fault in central Taiwan.